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EXAMINER

CULBERT, ROBERTS P

ART UNIT PAPER NUMBER

1763

DATE MAILED: 09/29/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/675,019

Applicant(s)

FUERHAUPTER ET AL.

Examiner

Roberts Culbert

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 September 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20, 22 and 25-43 is/are pending in the application.
- 4a) Of the above claim(s) 19 and 20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-18, 22 and 25-43 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 9/18/06 has been entered.

Claim Objections

The second Claim 6 should be renumbered Claim 7. Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claim 22 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim contains subject matter, which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The above-cited claim combines micro-roughening solution components from separate embodiments of the invention not disclosed as being used together in the same microroughening solution.

Response to Arguments

The Declaration under 37 CFR 1.132 filed 9/18/06 is insufficient to overcome the rejections as set forth in the last Office action because the arguments are not supported by the art and evidence record as recited below.

Applicant has argued, as stated in the declaration, those of skill in the art would recognize that neither Andresakis et al. nor Bayes et al. removes more than inadvertent amounts of metal from the metal surface, but instead merely form an oxide on the metal surface. The argument is not persuasive because applicant has simply asserted that the amount of metal removed by Bayes et al. is "inadvertent", but provides no evidence or reasoning that the amount of metal removed is a different amount than is removed by the claimed invention. Applicant's suggestion that a different amount of metal is removed is counterintuitive since Bayes et al. teaches the same micro-etching solution and etches the same material (copper).

Applicant has argued, as stated in the Declaration, Bayes et al. actually teaches away from removing metal during such adhesion promotion processes. The argument is not persuasive because nothing in the cited portion of Bayes et al. (C1, L39-61) teaches away from removing metal by microetching. The cited portion of Bayes states only that conversion coating is desirable in addition to microetching.

In response to applicant's argument that the references fail to teach the problem of galvanic edge effects, the fact that applicant has recognized another advantage that would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-5, 8-18 and 25-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,500,349 to Andresakis et al. in view of U.S. Patent Application Publication 2003/0029730 to Lee et al. and U.S. Patent 6,261,466 to Bayes et al.

Regarding Claim 1, Andresakis et al. teach a process to improve adhesion of dielectric materials to a metal layer comprising: providing an unpatterned metal layer, wherein the metal layer comprises a layer of copper having a first major surface, micro-roughening the first major surface to form a micro-roughened surface (Col. 4, lines 44-47) and etching the metal layer to form a circuit pattern the metal layer, wherein the micro-roughening is carried out prior to the etching.

Regarding Claim 28, Andresakis et al. teach a process to improve adhesion of dielectric materials to a metal layer comprising providing an unpatterned copper metal layer having a first major surface, micro-roughening the unpatterned metal layer with solution to form a micro roughened surface on the first major surface, applying an etch resist to the micro-roughened surface, patterning the resist, (Col. 6, Lines 1-2) etching the metal layer which is not protected by the resist to form a circuit pattern (Col. 6, Lines 14-20) and removing the resist (Col. 6, Lines 23-25) wherein the micro-roughened surface is not subjected to a further roughening. (Col. 7, Lines 18-21)

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Regarding Claim 36, Andresakis et al. teach a process to improve adhesion of dielectric materials micro-roughening the unpatterned metal layer with solution to form a micro roughened surface on the first major surface, applying an etch resist to the micro-roughened surface, patterning the resist, (Col. 6, Lines 1-2) etching the metal layer which is not protected by the resist to form a circuit pattern (Col. 6, Lines 14-20) and removing the resist (Col. 6, Lines 23-25) and optionally applying a secondary metal coating (Col. 7, Lines 22-27) and dielectric (Col. 7, lines 1-8) to the micro-roughened surface.

Regarding Claims 1, 28 and 36, as applied above, Andresakis et al. teach the method of the invention substantially as claimed, but does not expressly teach using a layer of copper and a layer of a second metal or alloy such as 64% iron and 36% nickel. However, Lee et al. teach that Copper-invar-copper (CIC) may be used to form circuit elements having low thermal expansion. It would have been obvious to one of ordinary skill in the art at the time of invention to use the copper-invar-copper composite of Lee et al. in the method of Andresakis in order to form circuit elements having low thermal expansion. Note that Lee et al. also teaches that the CIC material may be treated to improve adhesion properties. (Paragraph 41)

Further Regarding Claims 1, 28 and 36, Andresakis et al. teach the method of the invention substantially as claimed, but does not expressly teach using water, acid, oxidant, and corrosion inhibitor. Bayes et al. teach a micro-roughening treatment for copper to improve adhesion to polymers comprising treating with a solution of water, acid, oxidant, and corrosion inhibitor (tetrazole). It would have been obvious to one of ordinary skill in the art at the time of invention to the micro-roughening solution of Bayes to perform the micro-roughening step of Andresakis because Bayes teaches (See Col.1-6 of Bayes et al.) that the solution may be advantageously substituted for the prior art black-oxide type roughening that is described in Andresakis at Col. 4, Lines 44-59.

Further Regarding Claims 1, 28 and 36, Andresakis et al. do not expressly teach the amount of metal removed by the micro-roughening solution. However, since the prior art teaches the same micro-etching solution and etches the same material (copper) the limitation would necessarily be produced by one of ordinary skill in the art to form an adhesion surface.

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Regarding Claims 2, 29, and 37, Andresakis et al. teach the unpatterned metal layer is not treated to increase surface roughness prior to the micro-roughening.

Regarding Claims 3 and 38, Andresakis et al. teach the micro-roughened surface is not subjected to further roughening following the etching. (Col. 7, Lines 18-21)

Regarding Claims 4, 30 and 39, Andresakis et al. teach the cross sectional area of the circuit pattern is not substantially further reduced subsequent to the etching.

Regarding Claim 5, Bayes teaches cleaning prior to micro-roughening (Col. 6, Lines 21-35).

Regarding Claim 8, Andresakis et al. teach applying an etch resist to the micro-roughened surface and patterning the etch resist prior to the etching. (Col. 5, Line 36 – Col. 6, Line 14)

Regarding Claim 9, Andresakis et al. teach removing the etch resist. (Col. 6, Lines 23-25)

Regarding Claims 10, 31 and 40, Andresakis et al. teach applying a secondary metal coating to the circuit pattern. (Col. 7, Lines 22-27)

Regarding Claims 11 and 32, Andresakis et al. teach applying a dielectric material to the circuit pattern. (Col. 6, Line 41 – Col. 8, Line 11)

Regarding Claims 16-18, Bayes et al. teach the acid comprises sulfuric acid, peroxide such as hydrogen peroxide and corrosion inhibitors such as benzotriazole.

Regarding Claims 26 and 27, Andresakis et al. teach that the micro-roughened surface covers about 90% or substantially the entire first major surface since the entire foil is treated.

Regarding Claim 12, 13, 33, 34, 41 and 44, Andresakis et al. teach the method of the invention substantially as claimed, but do not expressly teach the galvanic edge effect. However, the claimed “edge effect” is an inherent result of the process, such as etched material (CIC) and microroughening mixture, and is therefore met by the prior art process or else arises from essential limitations not provided in the claims.

Regarding Claim 25, Andresakis et al. teach the method of the invention substantially as claimed, but do not expressly teach the resulting roughness produced by the micro-roughening solution. However, since the prior art teaches the same micro-etching solution and etches the same material copper the

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surface limitations would necessarily be produced by one of ordinary skill in the art of using such solutions to form an adhesion surface.

Claims 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,500,349 to Andresakis et al. in view of in view of U.S. Patent Application Publication 2003/0029730 to Lee et al. and U.S. Patent 6,261,466 to Bayes et al. as applied above to claims 1-5, 8-18 and 24-43, and in further view of U.S. Patent 6,562,149 to Grieser et al, U.S. Patent 6,036,758 to Fairweather, and U.S. Patent 4,637,899 to Kennedy, Jr.

Andresakis et al. teach the method of the invention substantially as claimed, but does not expressly teach cleaning and preconditioning with water-soluble alcohol and corrosion inhibitor prior to micro-roughening. However the steps of cleaning and conditioning prior to micro-etching are old and well known in the art. For example, Grieser teaches the known steps of cleaning and conditioning (predipping) with a corrosion inhibitor prior to micro roughening. (Col. 5, Lines 43-45) Fairweather teaches cleaning and conditioning prior to micro-roughening (Col. 4, Lines 15-23) Kennedy Jr. teaches corrosion inhibitor solutions containing water soluble alcohol in order to improve solubility, lower freezing point etc. (Col. 3, lines 17-37)

It would have been obvious to one of ordinary skill in the art at the time of invention to perform cleaning and pre-conditioning steps in order to prepare the substrate for microroughening in the well-known manner.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Roberts Culbert whose telephone number is (571) 272-1433. The examiner can normally be reached on Monday-Friday (8:30-5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



R. Culbert
Examiner
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